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A Brief Staff Training to Increase Children's Physical Activity During an After-School Program: Preliminary Effectiveness and Potential for Dissemination

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Abstract
This two-part study aimed to first evaluate the preliminary effectiveness of a brief staff training intervention to promote physical activity among children attending an after-school program, and then to determine the feasibility of delivering the training to a larger number of sites. Two Boys and Girls Club after-school sites (intervention, control) participated in Study 1. Accelerometer-measured physical activity of children and directly observed staff behaviors were assessed at each site in February and May 2019. Following baseline data collection, staff at the intervention site attended a brief physical activity promotion training, which emphasized expanding the quantity and enhancing the quality of physical activity opportunities. For Study 2, the training was delivered to all staff, and they completed pre- and post-training measures of self-efficacy and intention to implement strategies to promote physical activity. In Study 1, children at the intervention site decreased sedentary time by 14.8 min/day, and they increased light and moderate-to-vigorous physical activity by 7.8 and 7.0 min/day, respectively, relative to the control site. Instances of staff encouragement significantly increased at the intervention site. In Study 2, staff reported significant improvements in self-efficacy and intention immediately following the training. These studies provide preliminary evidence that a brief staff training intervention may increase physical activity among children attending an after-school program, and that the intervention can be integrated into existing training requirements. Future research is needed to replicate these findings across a wider range of after-school programs and to explore systematic approaches to offering sustainable physical activity training regularly at scale.

Keywords: physical activity promotion, youth settings, after-school, training, MVPA

The current U.S. physical activity guidelines indicate children should engage in at least 60 minutes of moderate-to-vigorous physical activity each day (USDHHS, 2018). Unfortunately, only about 24% of youth aged 6–17 years old meet this recommendation (CAHMI, 2016). Low levels of physical activity among youth are a significant public health concern because physical activity engagement is associated with multiple benefits, including reduced risk of obesity, improved cardiometabolic and bone health, improved cognitive function, and reduced risk of depression (Janssen & LeBlanc, 2010; USDHHS, 2018). Initiatives to increase physical activity among youth have targeted a variety of settings and contexts where children may have opportunities to be active, including school, home, youth sports, and community- and faith-based programs (National Physical Activity Plan Alliance, 2018).

After-school programs represent a critical opportunity to contribute to children's daily physical activity. In 2014, over 10 million children in the United States attended an after-school program (Afterschool Alliance, 2014). These programs may be an ideal setting to promote youth physical activity because they reach a large number of children, but expectations regarding academic and learning outcomes are typically lower, relative to school settings (Beighle & Moore, 2012). However, previous studies have demonstrated there is considerable room for improvement in terms of promoting physical activity during after-school

programs (Trost et al., 2008). For example, Beets et al. (2012) used pedometers to assess physical activity among 1,220 children across 25 community-based after-school programs and found children spent an average of 26.6 out of 125 minutes (21%) engaging in physical activity. The low levels of physical activity in after-school settings are likely a function of the structure and organization of these programs, as well as the extent to which physical activity is prioritized by program staff (Weaver et al., 2015).

Because the settings in which children spend their time are largely governed by adults (parents, teachers, etc.), children often are not able to make autonomous decisions about when, where, and how to be active. After-school programs are no exception; the activities in which children engage are organized and supervised by program staff who have a variety of backgrounds, experiences, interests, and goals (Hastmann et al., 2013). Previous studies have demonstrated that it is possible to increase the amount of moderate-to-vigorous physical activity (MVPA) in which children engage in youth activity settings (e.g., physical education, after-school programs, youth sports) by modifying the structure and rules of traditional games (McKenzie et al., 1996; Dzewaltowski et al., 2010; Guagliano et al., 2015). For example, the LET US Play principles recommend doing away with elimination games and standing in lines, reducing team sizes, and providing additional equipment so that all children can be continuously involved in activities (Brazendale et al., 2015). However, program staff may be unaware of such strategies, or may lack the confidence and/or motivation to implement them, without dedicated training focused on physical activity promotion (Zarrett et al., 2018). The multilevel Capability, Opportunity, Motivation, and Behavior (COM-B) model for physical activity in youth settings, recently proposed by Rosenkranz and colleagues, highlights the importance of addressing the capability, opportunity, and motivation of youth setting leaders in order to ultimately influence children's physical activity behaviors via improvements in the children's motivation and capability, as well as the opportunities provided to them (Rosenkranz et al., in press).

The Theory of Expanded, Extended, and Enhanced Opportunities (TEO) was developed by Beets and colleagues (2016) to provide a formal theoretical framework to guide physical activity interventions for youth. The TEO is grounded in evidence that youth are likely to be more active when they have more opportunities to be active (e.g., Brusseau & Kulinna, 2015; Cradock et al., 2016); thus, interventions can maximize their impact by expanding, extending, and enhancing these opportunities. Specifically, *expansion* refers to introducing new opportunities for children to be active, such as incorporating "brain breaks" in academic settings where breaks have not previously existed. *Extension* is the addition of time to existing physical activity opportunities, such as doubling the length of scheduled recess sessions. *Enhancement* is focused on improving the quality of existing physical activity opportunities to maximize the time children spend participating in health-enhancing physical activity during those times. For example, teachers or staff can modify games to reduce elimination or time spent standing in lines. Importantly, these approaches may be especially beneficial to youth who are less inclined to be active, as they provide the impetus for them to engage in physical activity when they might not otherwise choose to do so (Fairclough et al., 2012). There is evidence to support the effectiveness of each of these approaches to physical activity promotion, but there are also important practical and logistical considerations for each strategy. For example, if physical activity time is extended, what sedentary activity does it replace? Are organizations willing to make changes to prioritize physical activity (i.e., do organization officials have the motivation)? Are staff willing to learn and implement new approaches (i.e., do staff have the motivation and capability)? These questions warrant further investigation in a variety of real-world youth settings.

The present two-part study was designed to first evaluate the preliminary effectiveness of a brief staff training intervention on physical activity among children attending an after-school program, and then to determine the feasibility of delivering the training to a larger number of local after-school program sites by partnering with the existing community organization. The training was based on contemporary theoretical frameworks (TEO and COM-B) and was designed to be brief and practical for real-world application to facilitate future dissemination if effective. For Study 1, we hypothesized that children attending the intervention site would demonstrate increases in physical activity and reductions in sedentary behavior, relative to children attending a control site. For Study 2, we hypothesized that staff would report increased self-efficacy and intentions to enact strategies to promote physical activity following an all-staff training.

Methods

Setting

Boys and Girls Club (BGC) is a national organization that offers a variety of community-based programs to educate and empower youth, particularly for youth who are socioeconomically disadvantaged (www.bgca.org). BGC programs are intended to be affordable and accessible and promote healthy physical, social, emotional, and academic/career development. This study focused on the BGC after-school programs offered to elementary school students in Kansas.

The participating BGC sites conduct their after-school programs at the local elementary schools the children attend. The after-school programs last from 3:50–6:00 p.m.; however, parents can pick up their children at any time during the session, so the actual duration of attendance varies by child and by day. Each day, children have a healthy snack upon arrival, and then activities are led by program staff. Activities include, but are not limited to, active games, indoor/outdoor free play, homework/study time, reading, crafts, and puzzles/games. Children are often divided into smaller groups by grade in order to engage in age-appropriate activities with their peers. Because BGC receives much of its funding from grants, sites must adhere

to certain guidelines outlined by funders. For example, programs must devote a certain amount of time each day to academic programming. Each site has a full-time director and part-time staff. The director oversees the program and staff, develops activity plans for each week, and is primarily responsible for the organization of the site. Though the director does interact with the children, the part-time BGC staff are primarily responsible for leading and implementing daily activities.

Study 1 Procedures

For this quasi-experimental study, our research team examined the list of local BGC sites and identified two sites of similar size and socioeconomic status of the population they serve to become the intervention and control sites. Next, we contacted the directors of these two sites and asked if they would be willing to schedule a meeting with us to discuss a potential research project related to physical activity. Both directors agreed to meet; during the meeting, we discussed the goals of the project (to observe and measure children's physical activity while at BGC) and the process for collecting informed consent from children's parents. We did not discuss any type of training or intervention during this initial meeting. At the end of the meeting, each director indicated they believed the requirements for the study were reasonable and they would be willing to proceed with participation.

The study was approved by a university Institutional Review Board (IRB #9584). Following IRB approval, each director signed a written agreement agreeing to:

- facilitate participant enrollment, including obtaining parental consent and keeping a record of participating children;
- allow our research team to observe the after-school program and attach accelerometers to participating children for two one-week periods during the spring semester; and
- consider recommendations to increase physical activity during the after-school program, and support their staff in implementing recommended activities.

Once the agreement had been signed, dates for baseline data collection were scheduled in February 2019.

One week prior to baseline data collection, the director/staff at each site approached parents when they arrived to pick up their children and asked them to read the informed consent document and sign it if they agreed to have their child(ren) participate. The BGC directors kept signed consent documents in a locked cabinet on-site during this week and made a list of all participating children at the end of the week.

Standardized data collection forms were developed for written recording of accelerometer wear time, staff behaviors, and session activities during each day of observation. The latter two forms were adapted from previous research involving observation of Girl Scout troop leaders during meetings (Ornelas & Rosenkranz, 2009). Detailed instructions and examples were included on each form to promote consistent recording across observers. Prior to data collection, all research staff attended a one-hour training to review all data collection procedures and practice completing the forms.

Baseline data were collected over four days at each site. A total of 54 children participated across both sites. On data collection days, a minimum of three members of the research team arrived on-site ten minutes before the start of the after-school program. As children arrived, BGC staff directed participating children to the accelerometer station, where a member of the research team secured an accelerometer to the child's waist and recorded the accelerometer number and the exact start time. Children then proceeded with their usual activities and returned the accelerometer once their parent had arrived to pick them up, at which time the exact end time was recorded. On subsequent data collection days, children wore their same previously assigned accelerometer.

Two members of the research team conducted observations of BGC staff behaviors and activities. One individual continuously recorded every observed staff behavior that specifically encouraged or discouraged children to be physically active. All staff who were engaged in the primary activity (see description below) were observed. Behaviors were coded as encouragement/discouragement and verbal/physical. Verbal behaviors included praise, encouragement, or instructions (encouragement), as well as commands such as sit down, stand still, or stop running (discouragement). Physical encouragement included leading/offering physical activity opportunities, providing physical activity equipment, participating in physical activity with the children, and the like. There were no instances of physical discouragement. Observers recorded the exact time the behavior occurred, coded the behavior as encouragement/discouragement and verbal/physical, and included notes to specify the exact words the staff member used and the specific games they led or equipment they provided.

Another research staff member recorded information about the activities provided during the sessions for descriptive purposes. Specifically, the staff member recorded the start and end time of each primary activity (defined as the activity occupying at least 50% of the children), recorded the specific game or activity in which the children were engaged, and categorized the activity as one of the following: (a) active recreation, (b) non-active recreation, (c) free play, (d) snack, (e) study/homework, or (f) other. When children were divided into two groups (e.g., of younger and older children), two activities were then recorded simultaneously; thus, it was possible for the total activity time to exceed the total session time.

Following baseline data collection, we arranged to deliver the training intervention at the intervention site approximately one month after baseline data collection, in March 2019. The control site had no contact with the research team in between baseline and follow-up data collection and continued with their usual practices. Follow-up data were collected across four days at each site in May

2019. Data collection procedures were identical to the baseline procedures. Participating children wore the same uniquely numbered accelerometer they had worn at baseline.

Study 1 Intervention

Following the baseline observation period, the research team met to brainstorm strategies for increasing the quantity and/or quality of physical activity according to best practices from the literature and perceptions of what would be feasible and effective at BGC, based on session observations and previous discussions with the directors about BGC policies and procedures. Next, we developed a list of recommendations and met with the site director to present the recommendations and seek his input about the feasibility of the proposed strategies. Based on this feedback, we made some modifications to the recommendations. For example, the director indicated that BGC was not permitted to use the hallways in the school for physical activity, so we discussed activities that could be completed in classrooms instead, in the event that the gym and/or outdoor spaces were not accessible.

After meeting with the director, we developed a brochure to highlight key recommendations for enhancing physical activity during the after-school program. The included intervention strategies drew from the TEO and the multilevel COM-B model for physical activity in youth settings (Beets 2016; Rosenkranz et al., in press). The training aimed to enhance staff motivation and perceived capability by highlighting positive effects of physical activity on children's behavior (thus making leaders' jobs easier) and providing resources to facilitate implementation of recommended strategies. Recommendations focused on allocating more time for physical activity and increasing the quality of physical activity time provided. For example, during the baseline period we frequently observed staff instructing kids to "sit down" or "stop running around" while waiting for all children to arrive and finish their snack. We recommended having staff ready to begin active games immediately, and organizing games that children could easily join on the go. We also observed that when staff did lead active games, they often involved elimination (e.g., dodgeball) or standing in lines (e.g., relay races), and children quickly became bored and disinterested. Thus, the intervention also included a bag of game cards, each of which had instructions for an activity that would get all children moving and would require minimal instruction time. We encouraged staff to use the game cards to switch activities frequently, and to add their own games to the bag based on the children's preferences. Additionally, we observed that when typical physical activity spaces were unavailable (e.g., it was cold and rainy outside or the gym was occupied for a school event), staff defaulted to sedentary screen-based activities (e.g., computer lab or movies in classrooms). We helped the staff brainstorm physical activities they could do in small spaces, such as GoNoodle videos (www.gonoodle.com) or simple activities children could perform during "brain breaks."
The training intervention consisted of one 30-minute session with the available staff at the intervention site. The research team met with BGC staff immediately prior to the start of the after-school program. Six BGC staff, including the director, attended the training. Each attendee received a copy of the brochure, and a member of the research team explained each of the recommendations. The bag of game cards was also presented to the staff. Following the initial explanations, a discussion ensued, during which staff were asked to identify potential barriers or challenges they anticipated when implementing the recommended strategies and to brainstorm strategies for overcoming these barriers. Finally, at the end of the training, each staff member completed a goal-setting sheet, which prompted them to write down two specific things they could do to promote physical activity among children at BGC, and shared them with the group. The director took extra copies of the brochures and goal setting sheets to share with the 3-4 staff members who were not able to attend the training.

Study 1 Measures

Physical Activity

Physical activity was measured using Actigraph GT3X accelerometers (Actigraph, Pensacola, FL) worn on the waist. Data were recorded across 15-second epochs. All times outside of the wear periods recorded by the research team for each individual participant were excluded from analyses. Minutes of sedentary time, light activity, and MVPA were determined using cut points developed by Evenson and colleagues (2008). Total steps per program day were also extracted as an outcome.

Staff Behaviors and Program Activities

The total number of observed instances of staff encouragement and discouragement were summed at each site and time point. The total time in each activity category (e.g., free play, active recreation) was calculated by summing minutes at each site and time point, then dividing by four days of observation to yield average minutes per day.

Study 1 Data Analysis

For the physical activity outcomes, descriptive statistics were calculated using all available data at each site and time point. To improve the rigor of the analyses, the total sample was reduced to complete cases, defined as children with ≥ 2 days with ≥ 30 minutes of wear at both time points. Minutes per day in each intensity category were calculated by dividing the total minutes by valid days of wear. For each of the accelerometer outcomes, a change score was calculated by subtracting the baseline value from the follow-up value. Analysis of covariance (ANCOVA) tests were conducted to determine whether changes differed significantly between the intervention and control sites, controlling for total accelerometer wear time at baseline and follow-up. Staff behaviors and program activities were presented as frequencies for descriptive purposes. Additionally, chi-square analyses were conducted to examine whether the frequencies of encouragement and discouragement differed between sites from baseline to follow-up.

Study 2 Procedures

After data analysis from Study 1 was complete, our research team contacted the local BGC director of operations, who oversees a total of 10 BGC sites (eight elementary schools, two middle schools), to request a meeting to share the study results. During the meeting, our team presented the physical activity data, discussed our observations of changes in staff behaviors, and inquired about strategies for disseminating the training to more BGC staff. The director of operations explained that BGC conducts an all-staff training at the beginning of every semester and invited us to present at the upcoming training (spring 2020). Our team obtained IRB approval (IRB #10021) to collect survey data from the BGC staff attending the training.

The training took place at the BGC main site, which consists of several small classroom spaces and a full-sized gymnasium. On the day of the training, BGC staff were divided into three groups of 15–20 people. Each group rotated through three 2-hour sessions, one of which was the session devoted to physical activity promotion led by our team. At the start of the session, participants read and signed an informed consent document, then completed a baseline survey. At the end of the training session, described below, participants completed a brief post-training survey.

Our team planned to follow up with each site approximately two months after the training to evaluate the extent to which staff had implemented the recommendations discussed during the training. However, due to the COVID-19 pandemic, all BGC after-school programs were terminated for the duration of the spring 2020 semester, so we were unable to collect additional follow-up data as planned.

Study 2 Intervention

The training intervention consisted of approximately 75 minutes of presentation/discussion and 25 minutes of demonstration activities in the gymnasium. The intervention content was very similar to the Study 1 content, and used the same theoretical frameworks to present recommendations for increasing the quantity of time allotted to physical activity and the quality of allotted time. Because the time to deliver the intervention was longer, the training incorporated more discussion and opportunities for participants to share examples of effective strategies they have used to promote physical activity at BGC, along with challenges they have encountered or might encounter. We also provided the same bag of game cards from Study 1, but we had the opportunity to illustrate the implementation of this strategy by playing 4–5 of the games in the gymnasium at the end of the training.

Study 2 Measures

The baseline and post-training surveys included two questions assessing physical activity leadership self-efficacy and five questions assessing intention to engage in physical activity promoting behaviors developed specifically for this study. The self-efficacy questions asked staff to rate, on a scale ranging from 0 (not at all confident) to 10 (extremely confident), their confidence to (a) lead a 10-minute active recreation session at BGC; and (b) lead a 10-minute active recreation session at BGC where all kids enjoy being physically active at a moderate-to-vigorous level for a majority of the session. The intention questions asked staff to rate, on a scale from 0 (not at all likely) to 10 (extremely likely), how likely they are during the next week to (a) verbally encourage children to engage in physical activity; (b) organize/lead a physical activity or game; (c) ask for input from the children about physical activities they would like to do; (d) participate in physical activity with the children; and (e) implement "brain breaks." The self-efficacy and intention questions were averaged to create a total score at each time point. The post-training survey also included an open-ended question asking which of the strategies presented they would be most likely to try, and a question asking them to rate their interest in additional training on a scale from 1 (not at all interested) to 5 (extremely interested).

Study 2 Data Analysis

Differences in self-efficacy and intentions from baseline to post-training were assessed using paired samples *t*-tests.

Results

Study 1 Results

A total of 26 children (15 boys, 11 girls) from the intervention site and 28 children (20 boys, 8 girls) from the control site received parental consent to participate in the study. The total number of children attending the after-school program each day varied; typical attendance was 40–60 children per site. For the complete-case analysis, 14 children (6 boys, 8 girls) at the intervention site and 13 children (8 boys, 5 girls) at the control site had sufficient data at both time points. Incomplete data were primarily due to sporadic attendance or children departing for the day after wearing the accelerometer for less than 30 minutes. At both sites, participants from all grades (K–6) were represented; the age distribution did not differ between sites ($\chi^2 = 0.74$, $p = 0.69$).

Table 1 displays the average minutes per day spent in each of the activity categories at both sites and time points. At baseline, the largest proportion of time at both sites was spent in non-active recreation, which included drawing, crafts, board games, watching movies, and playing on computers or tablets. Time allocated to free play increased from baseline to follow-up at both sites, perhaps as a function of the weather allowing for more time outdoors. Time spent in active recreation (i.e., planned physical activity) primarily consisted of tag games and sports such as basketball and dodgeball, and that time was minimal except for the control site at baseline. The most dramatic change at the intervention site was a reduction in non-active recreation (computer lab time), which was primarily reallocated to increased free play and study time. "Other"

activities observed included bathroom breaks and waiting in line (e.g., to go outside).

Table 1. Distribution of Session Time Across Categories

Type of activity	Intervention site baseline (min/day)	Intervention site follow-up (min/day)	Control site baseline (min/day)	Control site follow-up (min/day)
Active recreation	7	7	29	1
Free play	21	57	14	56
Non-active Recreation	109	26	76	97
Study/homework	8	50	29	17
Snack	13	12	16	17
Other	6	1	0	0

Figure 1 depicts the total observed instances of physical activity encouragement and discouragement by staff across the four days of data collection. Results of a chi-square test revealed that the frequency of encouragement from baseline to follow-up was associated with condition (χ^2 = 5.73, p = 0.02), such that encouragement increased at the intervention site relative to the control site. Fewer instances of discouragement were observed at both sites at follow-up, but there was no association by condition (χ^2 = 0.48, p = 0.49). Instances of physical activity discouragement were primarily related to behavior management; kids were asked to sit down or stop running around when staff were trying to provide instructions or lead a non-active activity such as reading or arts and crafts. At the intervention site at follow-up, staff were more likely to "channel" the children's energy and incorporate opportunities for the kids to be up and moving around throughout the session. Of the 17 instances of physical activity encouragement at the intervention site at follow-up, 12 were identified as physical encouragement from staff (e.g., organizing games, participating in physical activity with the children, or incorporating "brain breaks"). Observed instances of verbal encouragement highlighted staff efforts to get all children to participate in activities (e.g., "Jump in the game!" or "Everyone get up and do a quick twirl.").

Figure 1. Observations of Staff Physical Activity Promotion Behaviors

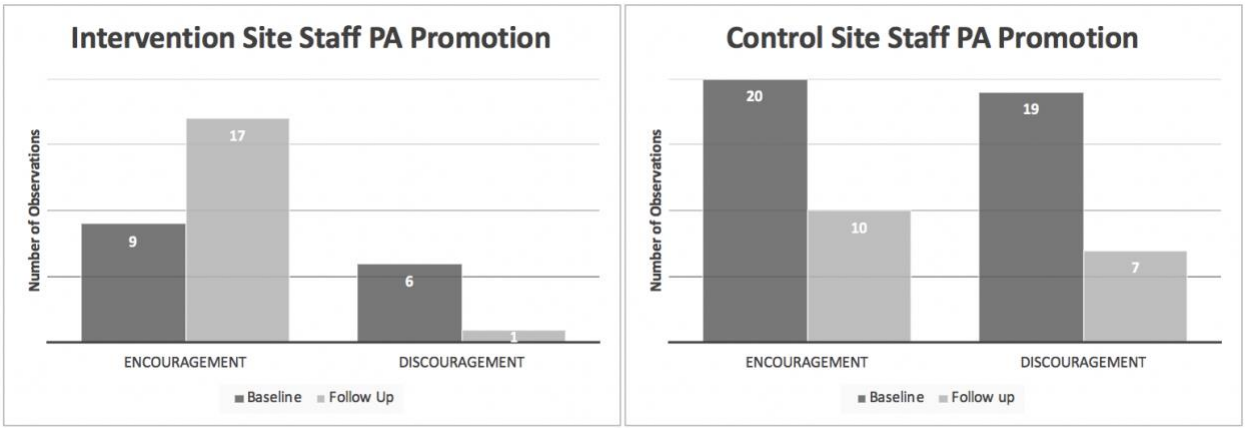

Table 2 presents the descriptive statistics for the physical activity variables. Means are reported for all available data and among the subsample with complete data. For most variables, the mean values were slightly lower when all data were included, since days with less than 30 minutes of wear were excluded from the complete case analysis. However, all outcomes showed similar changes from baseline to follow-up regardless of which data set was used; thus, the complete-case analysis will be reported. Among completers, children at the intervention site engaged in significantly more minutes of sedentary behavior at baseline than children at the control site (p = 0.04).

Table 2. Physical Activity Descriptive Statistics

Variable	Baseline completers[a] *M(SD)*	Follow-up completers *M(SD)*	Baseline all data[b] *M(SD)*	Follow-up all data *M(SD)*
Sedentary min/day intervention	47.2 (20.3)	30.0 (17.1)	41.8 (26.6)	28.1 (21.8)
Sedentary min/day control	33.3 (11.0)	30.5 (12.0)	25.8 (18.1)	24.2 (18.0)
Light min/day intervention	22.8 (8.9)	31.2 (6.8)	18.8 (11.3)	25.8 (12.9)
Light min/day control	28.3 (9.6)	28.0 (8.5)	24.8 (14.9)	21.8 (13.8)
MVPA min/day intervention	6.9 (2.5)	13.2 (3.9)	5.1 (4.5)	11.2 (6.6)
MVPA min/day control	10.5 (7.8)	10.0 (5.5)	10.2 (9.5)	8.3 (8.1)
Steps/day intervention	919 (276)	1644 (387)	720 (549)	1440 (745)
Steps/day control	1126 (584)	1132 (538)	1053 (803)	907 (792)
Total time control	72.2 (18.4)	68.5 (17.2)	60.8 (32.2)	54.4 (29.3)
Total time intervention	76.9 (20.0)	74.4 (17.6)	65.8 (32.6)	65.2 (30.2)

[a]Completers: Intervention site *n*=14; Control site *n*=13
[b]Total days included: Intervention site baseline: 75; Control site baseline: 90; Intervention site follow-up: 65; Control site follow-up: 59

Results of the ANCOVA tests revealed significant differences between the intervention and control sites for all accelerometer-measured variables. Specifically, relative to the control site, children at the intervention site decreased sedentary time by 14.8 min/day ($F(1,23) = 14.3$, $p = 0.001$, 95%CI = 7.1–22.5 min/day), and increased light activity by 7.8 min/day ($F(1,23) = 8.5$, $p = 0.008$, 95%CI = 2.5–13.0 min/day). In addition, children at the intervention site increased MVPA by 7.0 min/day ($F(1,23) = 11.5$, $p = 0.002$, 95%CI = 3.0–11.1 min/day) and accumulated an additional 713 steps/day ($F(1,23) = 12.8$, $p = 0.002$, 95%CI = 322–1104 steps/day) while at BGC relative to the control site.

Study 2 Results

A total of 53 individuals attended the all-staff training and provided complete baseline and post-training data. Of these, 14 were new employees, 38 were returning, and one did not provide an employment start date. There were 12 male participants (23%) and 41 female participants (77%). All nine of the local sites that offer after-school programming were represented at the all-staff training.

Average self-efficacy increased from 7.97 ($SD = 1.54$) at baseline to 9.28 ($SD = 0.77$) at follow-up ($t = -7.81$, $p < 0.001$). Intentions also significantly increased from 7.03 ($SD = 2.10$) at baseline to 8.64 ($SD = 1.54$) at follow-up ($t = -7.27$, $p < 0.001$).

In response to the open-ended question about what specific strategies staff would be most likely to try implementing at BGC, several common comments were recorded. Twenty participants specifically mentioned "brain breaks" as a strategy to incorporate more physical activity during all BGC activities, including the required academic programming. Twelve participants referenced "eliminate elimination" as a memorable recommendation and indicated that they planned to modify games to allow children to return to play rather than sitting out. Twelve participants identified the bag of game ideas as a useful tool and appreciated the examples of enjoyable games that they could easily lead at BGC.

When asked if they would be interested in additional training related to physical activity promotion, 31 participants (58%) said they were quite or extremely interested, 10 participants (19%) were somewhat interested, 8 participants (15%) were a little bit interested, and 3 participants (6%) were not at all interested. Unfortunately, due to COVID-19, we were unable to provide additional training or collect additional data to assess the extent to which staff implemented the recommended strategies while leading the BGC after-school programs.

Discussion

There is a documented need to increase physical activity participation among children, and training staff to provide high-quality opportunities for children to be active during after-school programs is one evidence-based approach to addressing this issue. Because staff turnover tends to be high in these settings (Cross et al., 2010), developing a training that is brief, inexpensive, and feasible to deliver on an ongoing basis is important for the sustainability of effective interventions. This study aimed to address these issues by first evaluating the preliminary effectiveness of a brief staff training intervention on physical activity among children attending an after-school program, and then exploring the feasibility of delivering the training to a larger number of local after-school program sites. Overall, the results were promising and suggest that a brief training that encourages staff to increase the quantity and quality of physical activity opportunities offered during an after-school program in ways that align with the program's needs can increase MVPA and reduce sedentary behavior in the attending children. Additionally, following an all-staff training, program staff reported increases in self-efficacy and intention to promote physical activity during the after-school program, which suggests the training has the potential to impact the perceived capability and motivation of leaders in this setting. Together, these studies provide an initial framework through which an effective physical activity promotion training could be embedded into organizations such as BGC that reach millions of youth each year.

Based on observations of the BGC sites, the significant increases in children's physical activity can likely be attributed to a number of changes in staff behaviors: allocating more time to free play, reducing screen time, minimizing verbal discouragement, and increasing encouragement. Previous studies have demonstrated that children accumulate more MVPA during free play compared with organized activity sessions (Trost et al., 2008), so the increases in both MVPA and free play at the intervention site in the present study are consistent with those findings. However, boys tend to be more active than girls during free play (Chandler et al., 2019; Trost et al., 2008), and organizations such as BGC have other goals and activities they must prioritize (e.g., programming focused on building academic and social emotional skills), so supplementing free play with more structured physical activity opportunities is typically necessary. Training staff to improve the quality of these opportunities is another approach to increasing children's MVPA. In the present study, we observed an increase in instances of physical activity encouragement by staff at the intervention site, primarily driven by enhanced physical encouragement (i.e., active physical activity leadership and involvement). These findings support previous research that has found increases in children's MVPA are most likely when staff are directly engaged in physical activity with the children, as well as when they provide organized physical activity opportunities and equipment (Huberty et al., 2013).

The training was intentionally designed to be brief (initially 30 minutes), as the intervention was developed with consideration for its potential to be broadly implemented in real-world settings if effective. In Study 2, the duration of the training was expanded to two hours, which was still feasible to incorporate into a required all-day training. The training was also designed to be relatively simple to deliver. In these studies, undergraduate research assistants with expertise in physical activity promotion led the trainings for BGC staff after receiving about one hour of training themselves. The brief duration and easy delivery are important, given the high turnover in positions such as after-school program staff (Weaver et al., 2016). The training would likely need to be repeated annually or biannually to continually reach new staff and have a continued impact of staff and youth behaviors. As such, establishing community partnerships (e.g., with the BGC Director of Operations) is critical for achieving a continual priority placement on the required all-staff training agenda (Hickey et al., 2018). In addition, developing a system whereby trainers (e.g., public health practicum students, state extension agents) can continually be trained to deliver the intervention to BGC staff is a key consideration for sustainability (Orfaly et al., 2005).

Unfortunately, due to the COVID-19 pandemic, we were unable to examine the effects of the all-staff training on staff or youth behaviors in Study 2. The initial improvements in self-efficacy and intentions to promote physical activity are encouraging, as is the strong interest in additional training, but it is unclear to what extent staff implemented changes following the training. Although the intervention was very similar to Study 1, one key difference was the extent to which the trainings were tailored to individual sites. In Study 1, our team had the opportunity to observe typical practices prior to the training intervention, and to meet with the site director to discuss key issues observed and provide tailored recommendations that aligned with the site's needs and goals. If a long-term goal is to move toward systemic implementation across the BGC organization, this level of tailoring would not be possible, and it is unclear how this would influence the effectiveness of the intervention. One approach to balancing fidelity with adaptiveness is to identify a number of "quality elements," based on contemporary theoretical frameworks and best practices, that are central to the intervention, but then allow sites to be flexible and adopt an approach to implementing these strategies that will work for their individual site (Hastmann et al., 2013).

Although the changes in physical activity in Study 1 were encouraging, they must be considered in the context of several limitations. First, the sample size was small and incorporated only one intervention and one control site. Furthermore, only about half of participating children had valid accelerometer data at both time points. However, results were comparable whether the analyses used all available data or complete cases only. Follow-up data were collected approximately one month after the training, so the extent to which changes in staff or youth behaviors were sustained over a longer period of time beyond one month is unknown. Staff knew they were being observed on data collection days and could have altered their behaviors, particularly during follow-up data collection at the intervention site. Children were also aware that the accelerometers were designed to measure their activity. However, as children were not aware of the study aims, the results support the TEO's assertion that having staff extend, expand, and enhance physical activity opportunities can directly impact physical activity behaviors of the children they supervise (Beets et al., 2016). Although MVPA nearly doubled at the intervention site, children were still engaging in only 13 minutes of MVPA per day on average, which is less than 25% of the recommended daily amount. The increase in MVPA by 6.3 min/day is similar to the increase observed in other after-school interventions (Dzewaltowski et al., 2010; Gortmaker et al., 2012), and it suggests that the after-school setting may meaningfully contribute to, but is unlikely to fulfill, the recommended amount of daily physical activity for youth.

A number of recommendations for future research and practice can be derived from the results of these studies. First, as with any on-site intervention, having leadership support is critical to successful implementation (Aarons et al., 2016). In the BGC setting, this includes both regional managerial directors and directors of individual sites. The former make decisions about training requirements and agendas for all staff, and the latter oversee the day-to-day operations of the after-school programs and choose which activities to prioritize. Providing evidence that physical activity can impact outcomes that are important to these leaders, such as children's attention and behavior, is likely to facilitate their buy-in and support (Mahar, 2011). Second, encouraging staff to incorporate a balance of free

play and organized physical activity opportunities is likely to provide an equitable approach to improving physical activity among all children while maintaining programming requirements (Zarrett et al., 2018). In particular, teaching staff innovative strategies for integrating physical activity into typically sedentary activities (such as "brain breaks") is likely to be well received by staff and children (Perera et al., 2015). Because staff will have varying levels of capability and motivation to promote physical activity among children, keeping requirements simple and providing resources (e.g., GoNoodle videos or a list of simple games and activities) to facilitate implementation of recommended strategies is likely to enhance staff compliance (Zarrett et al., 2018). Finally, future large-scale studies should investigate whether specific staff behaviors (e.g., verbal encouragement or discouragement, co-participation, allocation of time to specific activities) mediate changes in physical activity among children.

In conclusion, this set of studies provided preliminary evidence that a brief staff training intervention may increase physical activity among children attending an after-school program, and that physical activity promotion training can be feasibly integrated into existing training requirements. Future research is needed to replicate these findings across a wider range of after-school programs and to explore strategies for offering physical activity training regularly to promote sustainability.

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